

## Chemistry: What to Study Guide

Now to:

- Find the number of protons, electrons, and neutrons in an element using the periodic table of elements.
- Determine the number of valence electrons in an element.
- Draw Bohr models and Lewis Structures for different elements.
- Determine the number of protons, electrons, and neutrons in an ion or an isotope.
- Draw Lewis Structures showing how electrons are transferred in an ionic bond.
- Know how to read and interpret a phase change diagram
- Know how to identify more and less dense objects

**\*Also be sure to know all the vocabulary words and answers below\***

Vocabulary words: Define each.

- Boiling – change from liquid to gas
- Electron - a small, negatively charged particle found in the electron cloud
- Electron Cloud – the area around the nucleus of an atom where electrons are found
- Freezing – change from a liquid to a solid
- Gas – a state of matter that has neither a definite shape nor a definite volume
- Heterogeneous – a mixture that does not mix together evenly
- Homogeneous – a mixture that mixes together evenly
- Ionic Bond – type of bond that forms when electrons are transferred from one atom to another
- Liquid – state of matter that has a definite volume but not a definite shape
- Melting – change from solid to liquid

- Neutron – particle with no charge that is part of the nucleus of the atom
- Noble Gas – unreactive element in Group 18; it already has a full outer shell of electrons
- Nucleus – central part of an atom that is made of protons and neutrons
- Product – what comes out of a chemical reaction (the after!!)
- Proton – particle with a positive charge that is part of the nucleus of the atom
- Reactant – what goes into a chemical reaction (the before!!)
- Solid – state of matter that has a definite shape and a definite volume
- Valence Electron – electron in a atom's outermost shell or energy level

Answer the following questions:

- How is an **ion** different from the basic element?

- An ion has a charge
- An ion has a different number of electrons.

- How is an **isotope** different from the basic element?

- An isotope has a different atomic mass
- An isotope has a different number of neutrons

- What happens if we change the number of protons in the element?

- It becomes a new element

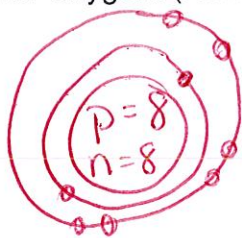
- Why do we not include the number of electrons in the atomic mass?

- Electrons are very small, so the mass of an electron is basically zero.

Name \_\_\_\_\_ Period \_\_\_\_\_

Use your periodic table to determine:

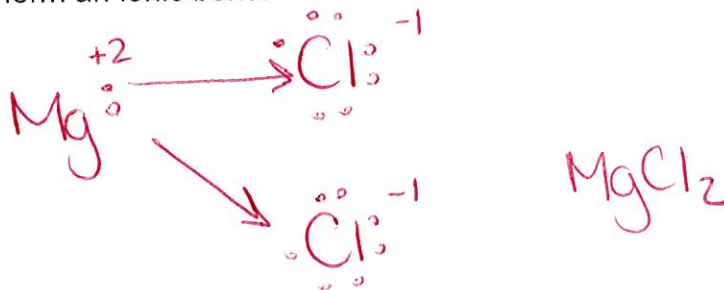
1. How many protons does a Carbon atom have? 6
2. How many neutrons does a Calcium atom have? 20
3. How many electrons does a Helium atom have? 2
4. How many valence electrons does Argon have? 18
5. How many electrons does oxygen want to gain to form an ion? 2
6. How many electrons in O-18? 8
7. How many neutrons in O-18? 10
8. How many protons in O-18? 8
9. If the charge of the ion is "plus 3" did we gain or lose electrons? lost
10. Draw a Bohr Model for Oxygen. (Hint: show all the electrons in their shells)



11. Draw a Lewis Structure for Magnesium. (Hint: show valence electrons in pairs)



12. Draw the Lewis structure to show how Magnesium and Chlorine will transfer electrons to form an ionic bond.





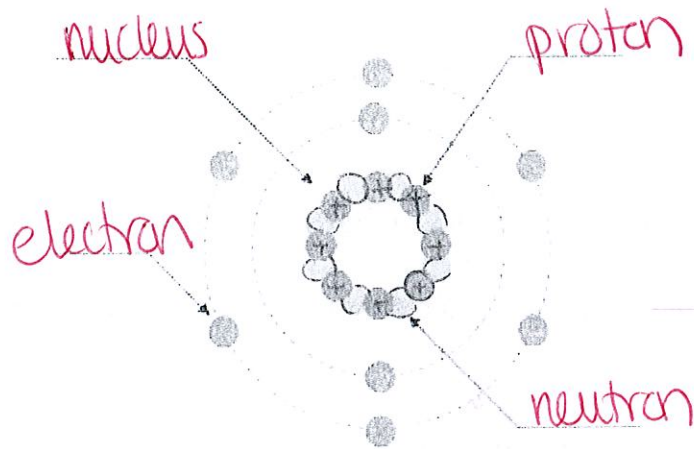
13. Explain the difference between a heterogeneous and a homogeneous mixture. Name an example of each.

Heterogeneous: a mixture that is not evenly mixed

examples: sand + water, salad

Homogeneous: a mixture that is evenly mixed  
examples: sugar water, chocolate milk

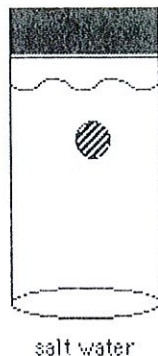
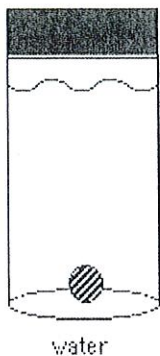
14. Label the protons, electrons, neutrons, and nucleus in the atom below:



15. Which has a higher density, salt water or water? How do you know?

A

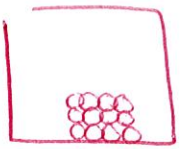
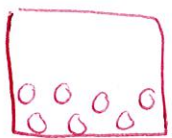

B



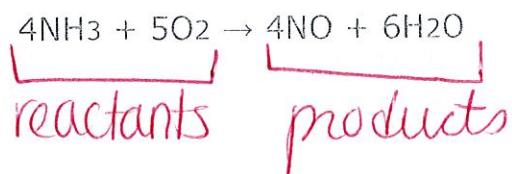
Salt water,  
because the ball  
floats higher in salt  
water

Name \_\_\_\_\_ Period \_\_\_\_\_

16. Draw examples of the particles in a solid, liquid, and gas. Explain what the particles are doing in each picture you draw.

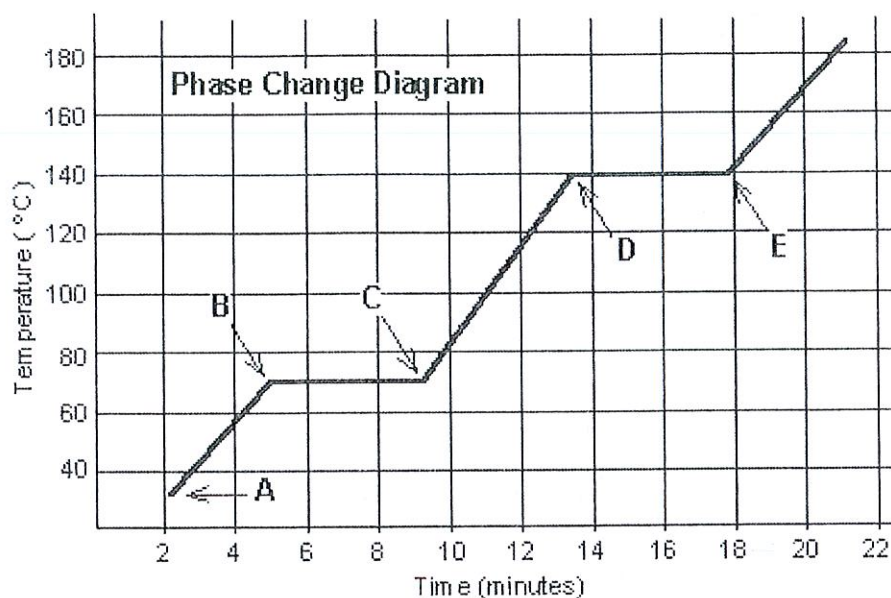
Solid	Liquid	Gas
 <ul style="list-style-type: none"><li>· vibrating</li><li>· fixed structure</li><li>· definite shape</li><li>· definite volume</li></ul>	 <ul style="list-style-type: none"><li>· flow</li><li>· definite volume</li><li>· no definite shape</li></ul>	 <ul style="list-style-type: none"><li>· fast moving</li><li>· spread to fill entire container</li></ul>

17. Label the reactants and products in the reaction below:



Name \_\_\_\_\_ Period \_\_\_\_\_

Use the phase change diagram below to answer the remaining questions:



1. What is the boiling point of this substance? 140°C
2. What is the state of matter at 60 degrees Celsius? Solid
3. Between what two letters do we find only liquids? CD
4. Between what two letters do we find freezing? BC
5. What is the state of matter at 8 minutes? liquid + solid

Name \_\_\_\_\_ Period \_\_\_\_\_

The answer to each question below is either ionic, covalent, or metallic.

1. In a(n) covalent bond, electrons are shared between two atoms.
2. In a(n) ionic bond, electrons are transferred from one atom to another.
3. In a(n) metallic bond, there is a sea of electrons shared by all the atoms.
4. A(n) covalent compound has a low melting point.
5. A(n) metallic compound is able to conduct electricity.
6. A(n) ionic compound can dissolve in water.



More Ions - ~~Homework~~

Element	Valence Electrons	Gains/Loses How many?	Charge	Cation/Anion
Lithium	1	lose 1	+1	cation
Potassium	1	lose 1	+1	cation
Chlorine	7	gain 1	-1	anion
Cobalt (II)	2	lose 2	+2	cation
Copper (I)	1	lose 1	+1	cation
Polonium	6	gain 2	-2	anion
Sulfur	6	gain 2	-2	anion
Phosphorus	5	gain 3	-3	anion
Francium	1	lose 1	+1	cation
Calcium	2	lose 2	+2	cation
Nitrogen	5	gain 3	-3	anion
Bromine	7	gain 1	-1	anion
Silver (III)	3	lose 3	+3	cation
Selenium	6	gain 2	-2	anion

And some isotopes:

## Carbon - 14

Atomic mass: 14Atomic number: 6Protons: 6Electrons: 6Neutrons: 8

## Iodine - 60

Atomic mass: 60Atomic number: 53Protons: 53Electrons: 53Neutrons: 7